

60. (Cancelled)

61. (Cancelled)

REMARKS

This application has been reviewed in light of the Office Action dated December 3, 2001. Claims 1, 2, 4, 7-14, 22, 23, 25, 28-34, 42, 43, 45, and 48-54 are pending in the application, with Claims 1, 2, 7-14, 22, 23, 28-34, 42, 43 and 48-54 having been amended. Claims 1, 22 and 42 are independent. Reconsideration and further examination are respectfully requested.

Claims 1-61 were rejected under 35 U.S.C. § 102(e) over U.S. Patent 5,940,065 (Babb et al.). Reconsideration and withdrawal of the rejection are respectfully requested.

The present invention concerns coordinate correction technology in which coordinate correction parameters for nonlinear conversion are calculated. In conventional systems nonlinear correction of the input coordinates could not always be accurately performed.

The present invention of independent Claims 1, 22 and 42 addresses the foregoing problem by displaying a plurality of reference points on a display, receiving coordinates designated for the plurality of reference points by a user, calculating correction parameters for nonlinear conversion based on the received coordinates, keeping the calculated

coordinates correction parameters, and correcting the inputted coordinates by using the kept coordinates correction parameters.

By virtue of this arrangement, since a plurality of reference points are displayed, it is possible to correct device characteristics of the coordinate input means, such as position aberration, using correction parameters calculated based on coordinates received from a user designation of the displayed reference points.

Referring specifically to the claims, independent Claim 1 defines a coordinates correction apparatus. The apparatus comprises a coordinate input means being placed on a display. A display control means controls the display of a plurality of reference points on the display. A coordinates reception means receives coordinates designated for the plurality of displayed reference points by user via the coordinate input means. A parameter calculation means calculates coordinates correction parameters for nonlinear conversion, based on the received coordinates. A parameter keeping means keeps the calculated coordinates correction parameters for nonlinear conversion, and a coordinates correction means corrects the coordinates inputted via the coordinates input means by the nonlinear conversion using the coordinates correction parameters kept by the parameter keeping means.

Amended independent Claim 22 defines a coordinates correction method for controlling a coordinates correction apparatus which has a coordinate input means placed on a display. The method comprises controlling the display of a plurality of reference points on the display. The method further comprises receiving coordinates designated for the plurality of displayed reference points by user via the coordinate input means. Coordinates correction parameters are calculated for nonlinear conversion, based on the received coordinates. Still

further, the method comprises keeping the calculated coordinates correction parameters for nonlinear conversion, and correcting the coordinates inputted in the coordinate input step by the nonlinear conversion using the kept coordinates correction parameters.

Amended independent Claim 42 defines a computer readable memory medium for storing a coordinates correction control program for controlling a coordinates correction apparatus which has a coordinate input means placed on a display. The program comprises code to control the display of a plurality of reference points on the display. The program further comprises code to receive coordinates designated for the plurality of displayed reference points by a user via the coordinate input means. The program still further comprises code to calculate the coordinates correction parameters for nonlinear conversion, based on the received coordinates. Additionally, the program comprises code to keep the calculated coordinates correction parameters for nonlinear conversion, and to correct the coordinates inputted in the coordinate input step by the nonlinear conversion using the kept coordinates correction parameters.

The applied art is not seen to disclose or suggest the invention as defined by independent Claims 1, 22 and 42, particularly with respect to the display of a plurality of reference points on the display, receipt of coordinates designated for the plurality of reference points by a user, calculation of coordinates correction parameters for nonlinear conversion based on the received coordinates, retention of the calculated coordinates correction parameters for nonlinear conversion, and correction of inputted coordinates by the nonlinear conversion using the retained coordinates correction parameters.

Babb et al. is seen merely to disclose coordinate correction by detecting touches at various positions of the sensor substrate surface, calculating a mapping coefficient, and executing coordinate correction by using the mapping coefficient. Babb et al. is not seen to disclose or teach that plural reference points are displayed on a display. Furthermore, Applicant submits that Babb et al. also fails to disclose or suggest that a user touches the reference points. In Babb et al., a user merely touches a predetermined point on a circuit board.

In contrast, according to the claimed invention, by displaying plural reference points on a display and calculating coordinates correction parameters based on user designation of the reference points, it is possible to correct the device characteristics of the coordinate input means, such as position aberration. Babb et al. does not disclose or suggest the display of a plurality of reference points on the display, receipt of coordinates designated for the plurality of reference points by a user, calculation of coordinates correction parameters for nonlinear conversion based on the received coordinates, retention of the calculated coordinates correction parameters for nonlinear conversion, and correction of inputted coordinates by the nonlinear conversion using the retained coordinates correction parameters.

Accordingly, Babb et al. is not seen to disclose or to suggest the features of independent Claims 1, 22 and 42, and Applicant respectfully requests withdrawal of the rejection under 35 U.S.C. § 102(e).

The other claims depend directly or indirectly from one of the independent claims discussed above, and are believed to recite additional features also allowable over the

art. Accordingly, independent consideration of each of these claims on their respective merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our Costa Mesa, California office by telephone at (714) 540-8700. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,


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VERSION SHOWING CHANGES MADE TO CLAIMS



1. (Amended) A coordinates correction apparatus comprising:

[a coordinates reception means for receiving coordinates from a coordinates input means of locations optionally indicated on a coordinates input area of the coordinates input means;]

a coordinate input means being placed on a display;

a display control means for controlling the display of a plurality of reference points on the display;

a coordinates reception means for receiving coordinates designated for the plurality of displayed reference points by user via said coordinate input means;

a parameter calculation means for calculating coordinates correction parameters for nonlinear conversion, based on the received coordinates;

a parameter keeping means for keeping [quadratic nonlinear conversion constants as] the calculated coordinates correction parameters for [correction of the coordinates received by the coordinates reception means] nonlinear conversion; and

a coordinates correction means for correcting the coordinates [received by the] inputted via said coordinates [reception] input means by [quadratic] the nonlinear conversion using the coordinates correction parameters kept by the [coordinates] parameter keeping means.

2. (Amended) The coordinates correction apparatus of Claim 1, wherein the

coordinates correction parameters [of the parameter keeping means] are a, b, c, d, e, f, g, and h and wherein the [quadratic] nonlinear conversion for correcting the coordinates (x, y) [received by] inputted via the coordinates [reception] input means to corrected coordinates (X, Y) is expressed by:

$$X = axy + bx + cy + d$$

$$Y = exy + fx + gy + h.$$

3. (Cancelled)

5. (Cancelled)

6. (Cancelled)

7. (Amended) The coordinates correction apparatus of Claim [6] 1, wherein the parameter calculation means [further comprises a discrimination means for discriminating which of the multiple reference points indicated corresponds to the coordinates of an indicated location] discriminates that the received coordinates is which of the plurality reference points, and calculates the coordinates correction parameters for the nonlinear conversion based on the discriminated coordinates.

8. (Amended) The coordinates correction apparatus of Claim [6] 1, wherein

the parameter calculation means calculates the coordinates correction parameters by solving simultaneous equations based on the [indicated] received coordinates corresponding to the [multiple] plurality of displayed reference points.

9. (Amended) The coordinates correction apparatus of Claim [6] 1, wherein [the multiple reference points are displayed] said display is [by] a liquid crystal display.

10. (Amended) The coordinates correction apparatus of Claim [6] 1, wherein [four designated coordinates] the plurality of displayed reference points is four reference points expressed in pairs of two x coordinates and two y coordinates [are used as the multiple reference points if the coordinates system on the coordinates input area is a coordinates system expressed] in an xy rectangular coordinates system.

11. (Amended) The coordinates correction apparatus of Claim 10, wherein the parameter calculation means calculates the coordinates correction parameters a, b, c, d, e, f, g, and h by solving the following formulas where the coordinates of the four reference points as (X_0, Y_0) , (X_1, Y_0) , (X_0, Y_1) , and (X_1, Y_1) , setting the received coordinates [of the pointed locations with aiming at points] as (x_{nw}, y_{nw}) , (x_{ne}, y_{ne}) , (x_{sw}, y_{sw}) , and (x_{se}, y_{se}) ;

$$X_0 = ax_{nw}y_{nw} + bx_{nw} + cy_{nw} + d$$

$$Y_0 = ex_{nw}y_{nw} + fx_{nw} + gy_{nw} + h$$

$$X_1 = ax_{ne}y_{ne} + bx_{ne} + cy_{ne} + d$$

$$Y_0 = ex_{ne}y_{ne} + fx_{ne} + gy_{ne} + h$$

$$X_0 = ax_{sw}y_{sw} + bx_{sw} + cy_{sw} + d$$

$$Y_1 = ex_{sw}y_{sw} + fx_{sw} + gy_{sw} + h$$

$$X_1 = ax_{se}y_{se} + bx_{se} + cy_{se} + d$$

$$Y_1 = ex_{se}y_{se} + fx_{se} + gy_{se} + h[;]_1$$

wherein the parameter keeping means keeps the calculated coordinates correction parameters a, b, c, d, e, f, g, and h[;]_1 and

wherein the coordinates correction means corrects the coordinates inputted via said coordinate input means (x, y) [received from the coordinates reception means] to corrected coordinates (X, Y) by the [quadratic] nonlinear conversion[:]

$$X = axy + bx + cy + d$$

$$Y = exy + f x + gy + h.$$

12. (Amended) The coordinates correction apparatus of Claim [5] 1, further comprising a [switching] deciding means for [causing the correction of coordinates by the coordinates correction means if coordinates correction parameters are kept by the parameter keeping means or causing the calculation of coordinates correction parameters by the parameter calculation means if coordinates correction parameters are not held by the parameter keeping means when the coordinates reception means receives indicated coordinates] deciding that the calculation of the coordinate correction parameters by said display control

means, said coordinates reception means and said parameter calculation means is executed if said parameter keeping means does not keep the coordinates correction parameters.

13. (Amended) The coordinates correction apparatus of Claims 1[to 12],
wherein the coordinates correction apparatus is a portable information processing apparatus.

14. (Amended) The coordinates correction apparatus of Claims 1 [to 13],
wherein the coordinates correction apparatus can be connected to a network.

15. (Cancelled)

16. (Cancelled)

17. (Cancelled)

18. (Cancelled)

19. (Cancelled)

20. (Cancelled)

21. (Cancelled)

22. (Amended) A coordinates correction method for controlling [the] a coordinates correction apparatus[,]
which has a coordinate input means placed on a display, the method comprising [the steps of]:

controlling the display of a plurality of reference points on the display;

receiving coordinates [of locations arbitrarily pointed to on a coordinates input area]
designated for the plurality of displayed reference points by user via said coordinate input means;

calculating coordinates correction parameters for nonlinear conversion, based on the received coordinates;

keeping [quadratic nonlinear conversion constants as] the calculated coordinates correction parameters for nonlinear conversion; and

correcting the coordinates [received] inputted in the [coordinates receiving] coordinate input step by the [quadratic] nonlinear conversion using the [coordinates correction parameters] kept [in the parameter keeping step] coordinates correction parameters.

23. (Amended) The coordinates correction method of Claim 22, wherein the coordinates correction parameters [in said parameter keeping step] are a, b, c, d, e, f, g, and h, and wherein the [quadratic] nonlinear conversion for correcting the coordinates (x, y) [received from] inputted via the coordinates [reception means] input step to the corrected coordinates (X,

Y) in said coordinates correction step is represented by

$$X = ax + by + cx + d$$

$$Y = ex + fy + gx + h.$$

24. (Cancelled)

26. (Cancelled)

27. (Cancelled)

28. (Amended) The coordinates correction method of Claim [27] 22, wherein the parameter calculation step [further comprises a discrimination step of determining which of the multiple reference points corresponds to the coordinates of an pointed location] discriminates that the received coordinates is which of the plurality reference points, and calculates the coordinates correction parameters for the nonlinear conversion based on the discriminated coordinates.

29. (Amended) The coordinates correction method of Claim [27] 22, wherein the coordinates correction parameters are calculated in the parameter calculation step by solving simultaneous equations based on the [indicated] received coordinates corresponding to the [multiple] plurality of displayed reference points.

30. (Amended) The coordinates correction method of Claim [27] 22, wherein [the multiple reference points are displayed] said display is [by] liquid crystal display.

31. (Amended) The coordinates correction method of Claim [27] 22, wherein [four designated coordinates] the plurality of displayed reference points is four reference points expressed in pairs of two x coordinates and two y coordinates [are used as the multiple reference points in the case that on the coordinates input area is expressed] in an xy rectangular coordinates system.

32. (Amended) The coordinates correction method of Claim 31, wherein coordinates correction parameters, a, b, c, d, e, f, g, and h, are calculated in the parameter calculation step by solving the following formulas where the coordinates of the four reference points as (X_0, Y_0) , (X_1, Y_0) , (X_0, Y_1) , and (X_1, Y_1) , setting the received coordinates [of the pointed locations with aiming at points] as (x_{nw}, y_{nw}) , (x_{ne}, y_{ne}) , (x_{sw}, y_{sw}) , and (x_{se}, y_{se}) :

$$X_0 = ax_{nw}y_{nw} + bx_{nw} + cy_{nw} + d$$

$$Y_0 = ex_{nw}y_{nw} + fx_{nw} + gy_{nw} + h$$

$$X_1 = ax_{ne}y_{ne} + bx_{ne} + cy_{ne} + d$$

$$Y_0 = ex_{ne}y_{ne} + fx_{ne} + gy_{ne} + h$$

$$X_0 = ax_{sw}y_{sw} + bx_{sw} + cy_{sw} + d$$

$$Y_1 = ex_{sw}y_{sw} + fx_{sw} + gy_{sw} + h$$

$$X_1 = ax_{se}y_{se} + bx_{se} + cy_{se} + d$$

$$Y_1 = ex_{se}y_{se} + fx_{se} + gy_{se} + h[;],$$

wherein the calculated coordinates correction parameters are kept in the parameter keeping step[;], and

wherein the coordinates inputted via said coordinate input step (x, y) [received in the coordinates reception step] are corrected to corrected coordinates (X, Y) in the coordinates correction steps by the [quadratic] nonlinear conversion:

$$X = axy + bx + cy + d$$

$$Y = exy + fx + gy + h.$$

33. (Amended) The coordinates correction method of Claim [26] 22, further comprising a [switching] deciding step of [causing the correction of coordinates by the coordinates correction step if coordinates correction parameters are kept by the parameter keeping step or causing the calculation of coordinates correction parameters by the parameter calculation step if coordinates correction parameters are not held by the parameter keeping step when the coordinates reception step receives indicated coordinates] deciding that the calculation of the coordinate correction parameters by said display controlling step, said coordinates receiving step, and said parameter calculation step is executed if said keeping step does not keep the coordinates correction parameters.

34. (Amended) The coordinates correction method of Claims 22 [to 33] which is a coordinates correction method for controlling a portable information processing apparatus.

35. (Cancelled)

36. (Cancelled)

37. (Cancelled)

38. (Cancelled)

39. (Cancelled)

40. (Cancelled)

41. (Cancelled)

42. (Amended) A computer readable memory medium for storing a coordinates correction control program for controlling a coordinates correction apparatus which has a coordinate input means placed on a display, [comprising the steps of] the program comprising:

code to control the display of a plurality of reference points on the display;

[receiving] code to receive coordinates [of locations arbitrarily pointed to in a coordinates input area] designated for the plurality of displayed reference points by user via said

coordinate input means;

code to calculate coordinates correction parameters for nonlinear conversion,

based on the received coordinates;

[keeping quadratic nonlinear conversion constants as] code to keep the calculated
coordinates correction parameters for nonlinear conversion; and

[correcting] code to correct the coordinates [received] inputted in the [coordinates
reception] coordinate input step by the [quadratic] nonlinear conversion using the [coordinates
correction parameters] kept [by the parameter keeping means] coordinates correction parameters.

43. (Amended) The computer readable memory medium of Claim 42, wherein
the coordinates correction parameters [in said parameter keeping step] are a, b, c, d, e, f, g, and h,
and wherein the [quadratic] nonlinear conversion for correcting the coordinates (x, y) [received
from] inputted via the coordinates [reception means] input step to the corrected coordinates (X,
Y) in said coordinates correction step is represented by

$$X = axy + bx + cy + d$$

$$Y = exy + fx + gy + h.$$

44. (Cancelled)

46. (Cancelled)

47. (Cancelled)

48. (Amended) The computer readable memory medium for storing a coordinates correction control program of Claim [47] 42, wherein the parameter calculation step [further comprises a discrimination step of determining which of the multiple reference points corresponds to the coordinates of an pointed location] discriminates that the received coordinates is which of the plurality reference points, and calculates the coordinates correction parameters for the nonlinear conversion based on the discriminated coordinates.

49. (Amended) The memory medium that can be read by a computer storing a coordinates correction control program of Claim [47] 42, wherein the coordinates correction parameters are calculated in the parameter calculation step by solving simultaneous equations based on the [indicated] received coordinates corresponding to the [multiple] plurality of displayed reference points.

50. (Amended) The memory medium that can be read by a computer storing a coordinates correction control program of Claim [47] 42, wherein [the multiple reference points are displayed] said display is [by] liquid crystal display.

51. (Amended) The memory medium that can be read by a computer storing a coordinates correction control program of Claim [47] 42, wherein [four designated coordinates]

the plurality of displayed reference points is four reference points expressed in pairs of two x coordinates and two y coordinates [are used as the multiple reference points in the case that on the coordinates input area is expressed] in an xy rectangular coordinates system.

52. (Amended) The memory medium that can be read by a computer storing a coordinates correction control program of Claim 51, wherein coordinates correction parameters, a, b, c, d, e, f, g, and h, are calculated in the parameter calculation step by solving the following formulas where the coordinates of the four reference points as (X_0, Y_0) , (X_1, Y_0) , (X_0, Y_1) , and (X_1, Y_1) , setting the received coordinates [of the pointed locations with aiming at points] as (x_{nw}, y_{nw}) , (x_{ne}, y_{ne}) , (x_{sw}, y_{sw}) , and (x_{se}, y_{se}) :

$$X_0 = ax_{nw}y_{nw} + bx_{nw} + cy_{nw} + d$$

$$Y_0 = ex_{nw}y_{nw} + fx_{nw} + gy_{nw} + h$$

$$X_1 = ax_{ne}y_{ne} + bx_{ne} + cy_{ne} + d$$

$$Y_0 = ex_{ne}y_{ne} + fx_{ne} + gy_{ne} + h$$

$$X_0 = ax_{sw}y_{sw} + bx_{sw} + cy_{sw} + d$$

$$Y_1 = ex_{sw}y_{sw} + fx_{sw} + gy_{sw} + h$$

$$X_1 = ax_{se}y_{se} + bx_{se} + cy_{se} + d$$

$$Y_1 = ex_{se}y_{se} + fx_{se} + gy_{se} + h$$

wherein the calculated coordinates correction parameters are kept in the parameter keeping step[;], and

wherein the coordinates inputted via said coordinate input step (x, y) [received in

the coordinates reception step] are corrected to corrected coordinates (X, Y) in the coordinates correction steps by the [quadratic] nonlinear conversion[:]

$$X = axy + bx + cy + d$$

$$Y = exy + fx + gy + h.$$

53. (Amended) The computer readable memory medium for storing a coordinates correction control program of Claim [56] 42, further comprising a [switching] deciding step of [causing the correction of coordinates by the coordinates correction step if coordinates correction parameters are kept by the parameter keeping step or causing the calculation of coordinates correction parameters by the parameter calculation step if coordinates correction parameters are not held by the parameter keeping step when the coordinates reception step receives indicated coordinates] deciding that the calculation of the coordinate correction parameters by said display controlling step, said coordinates receiving step, and said parameter calculation step is executed if said keeping step does not keep the coordinates correction parameters.

54. (Amended) The computer readable memory medium for storing a coordinates correction control program of Claims 42 [to 53], which is a coordinates correction program for controlling a portable information processing apparatus.

55. (Cancelled)

56. (Cancelled)

57. (Cancelled)

58. (Cancelled)

59. (Cancelled)

60. (Cancelled)

61. (Cancelled)